NATIONAL DEFENSE INDUSTRIAL ASSOCIATION
STRENGTH THROUGH INDUSTRY & TECHNOLOGY

NDIA/AIAA Interoperability & System Integration Conference

Industry Session

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Interoperability Challenges

- Huge number of “separate” systems
- Unique/non-standard messages
- Systems continue to change

JBMC2 Mandate: Interoperability or retirement by 08’

ppropriate, but challenging, goal that requires systematic proce to assure success

Interoperability Definition (from JBMC2 Roadmap Industry Summit)

- **Definition of interoperability –** *The ability of systems, units, or forces to provide service to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together.*
  - **DoDI 4630.8** defines a process for achieving systems interoperability … uses mission area integrated architectures as the basis for interoperability requirements …
  - **CJCSI 6212.01C** details a methodology to develop interoperability key performance parameters (KPPs) based on integrated architecture products …
  - **CJCSM 3170.01** states interoperability KPPs are based on the top-level information flows depicted as information exchanges in OV-3s …
  - **Joint Technical Architecture (JTA)** (and other sources) suggest developing Technical Views (TVs) to define standards and rules governing the … interaction and interdependence of systems … use TVs to promote efficiency and interoperability …

ecurring Theme – Use Architectures to Define/Implement Interoperabili
Definition must have JBMC2 context (relevant /tailored)

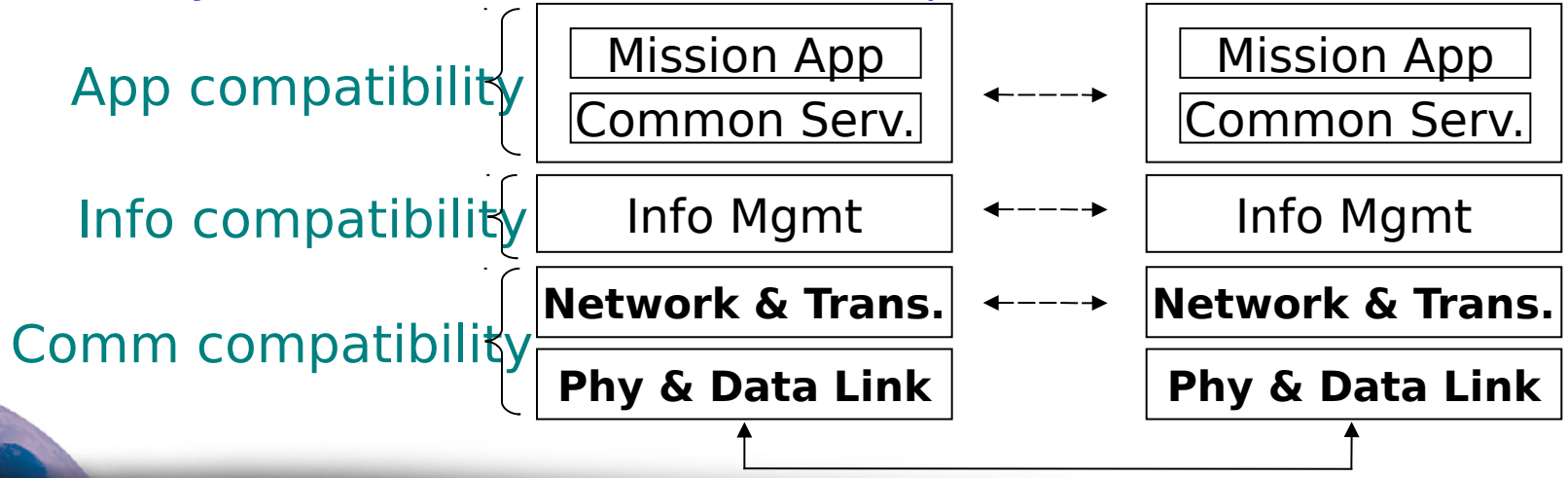
Network Centric Interoperability

- NC Communications Interoperability ensures bits move between nodes

- NC Information Interoperability ensures:
  - Bits converted correctly into information
  - Information exchange properly managed
  - Applications find compatible applications to collaborate with and understand semantics of information exchanged

General Node Level Interoperability

- Interoperability between two nodes requires
  - Application compatibility
    - Logic – including algorithmic compatibility
    - Information semantics
  - Information management compatibility
    - Syntax, middleware
  - Communications compatibility
    - Physical, data link, network, transport



Future Combat Systems (FCS) Interoperability Challenges

- 85 systems required
- Vast amounts of unique/non-standard messages
- Limited amount of testing with live systems
- Interoperability services time-phasing with C2 services development
- External systems changing – need synchronized change process

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FCS Interoperability Services Levels

- Simple Message Exchange
  - Uses Proxies and translators
  - Limited to Situation Awareness via positional data
  - Requires prior knowledge of systems, sensors, and effectors
- Dissemination and Discovery
  - Nodes discover other nodes capabilities without prior knowledge or planning (i.e. “devices on the net”)
    - Exchange done via native XML communication
- Common C2 Services
  - No human translation or analysis/understanding required
  - Everyone “sees” same thing

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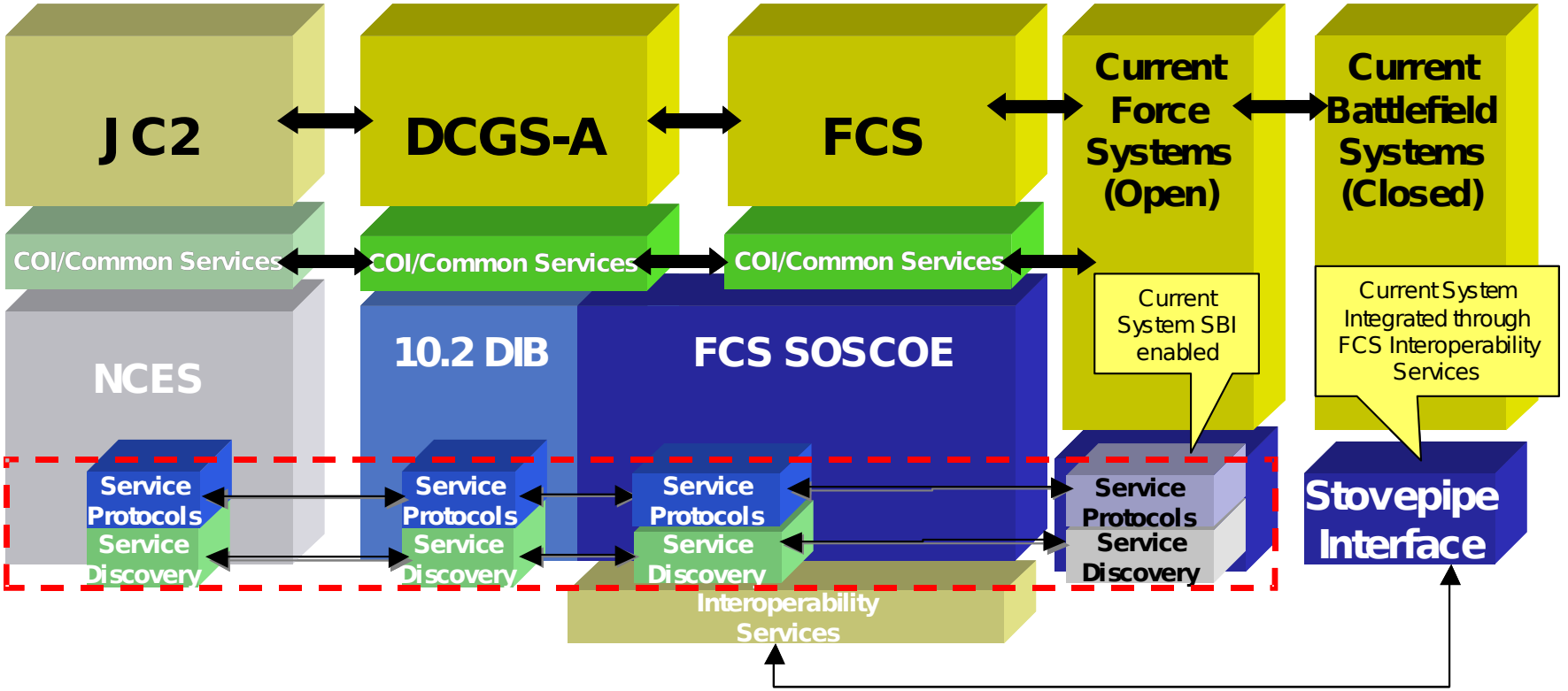
FCS Interoperability Architecture



Current systems provide a Service Based Interface (SBI) to the SOSCOE system (Open Architecture) or have a specific conversion service within Interoperability Services to enable their capabilities as services (Closed Interface)

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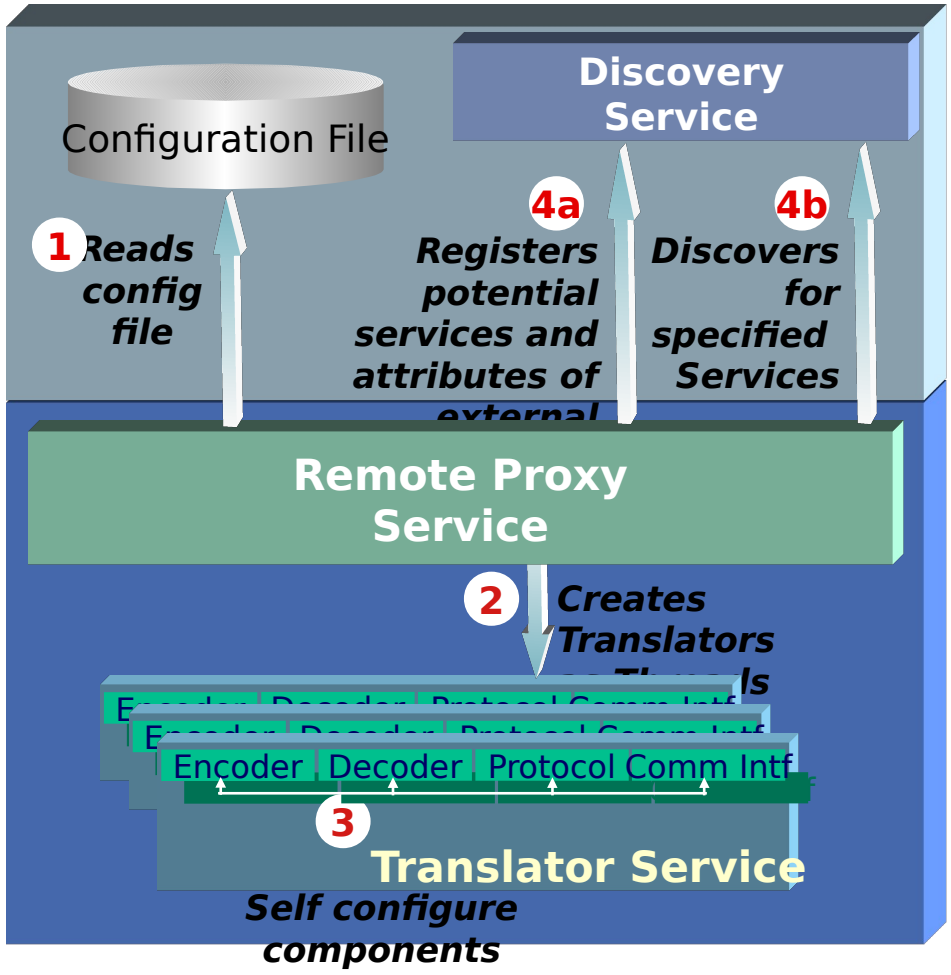
FCS Interoperability Enabling Services

- **Remote Proxy Services**
- **Self Configuring Translator(s)**
- **Discovery Service**



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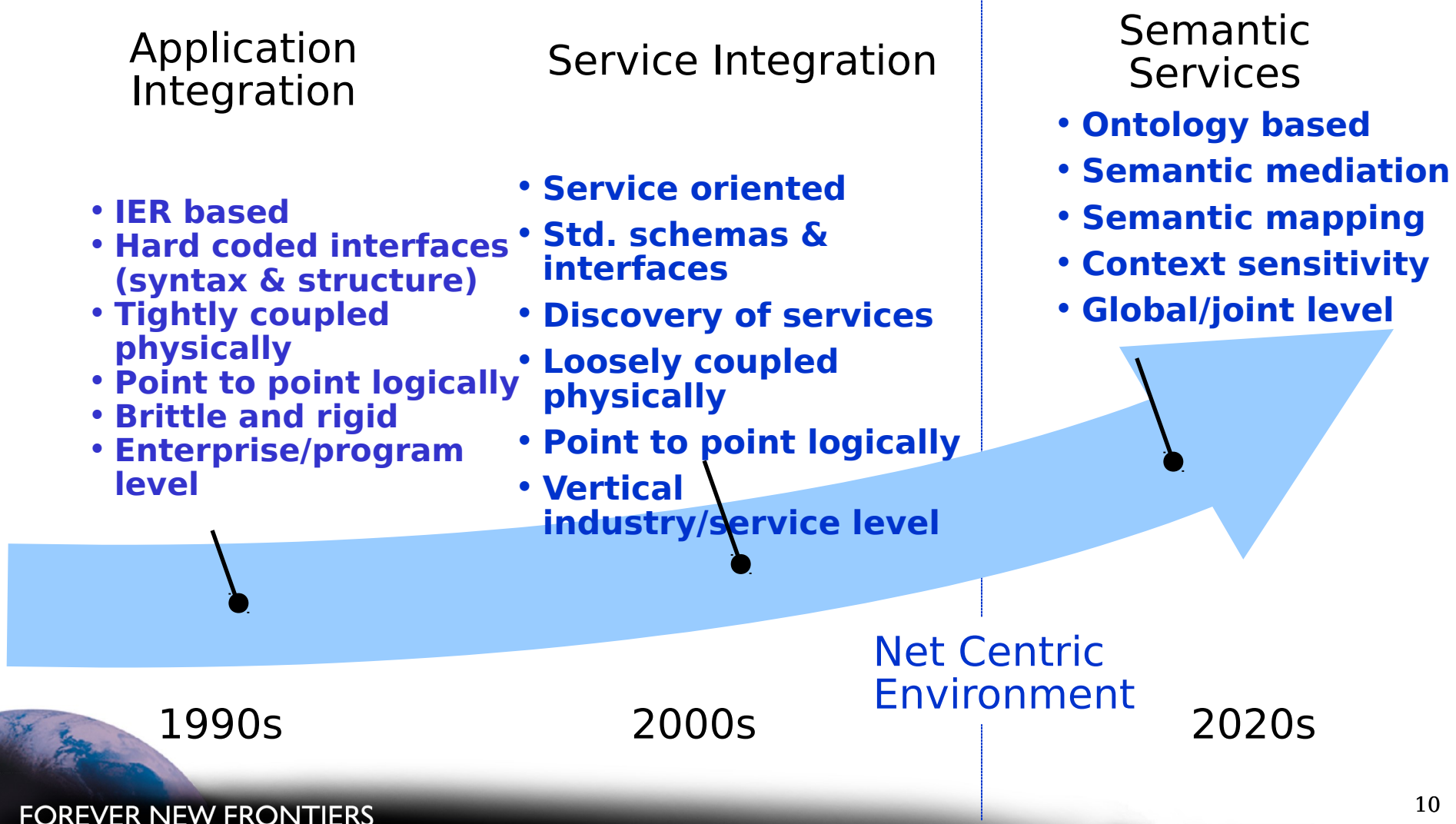
Roadmap To Interoperability



Interoperability Recommendations

- Create JBMC2-level architecture to drive interoperability
- Use systematic process to assess level of interoperability affordably achieved by each current system
- Have a current force “hit list” of interoperability issues to solve and derive lessons-learned
- Settle on a limited, but not singular, set of message and data standards – consistent with JBMC2 architecture and warfighting environment
- Provide rapid, adaptable testing with emulated and live systems in realistic environment
- Provide mechanism for publishing changes to current systems to allow pre-synchronization of future systems